CLAIMS

1. Method for processing an image acquired by means of a guide consisting of a plurality of optical fibres, characterized in that, for each optical fibre, a zone corresponding to this optical fibre is isolated on the acquired image, each zone is locally processed individually, then the acquired image is reconstructed eliminating the pattern due to the optical fibres.

2. Method according to claim 1, characterized in that, in order to isolate each zone, a mask, corresponding to the pattern of the fibres, is applied to the acquired image.

3. Method according to claim 2, characterized in that the mask, corresponding to an image of the related components representing each fibre, is obtained during a stage of detecting the fibres from a reference image.

4. Method according to claim 3, characterized in that the stage of detecting the fibres comprises the following stages:

- prefiltering of the reference image,
- segmentation by region,
- correction of segments having an abnormally large surface, and
- correction of segments having an abnormally small surface.

5. Method according to claim 4, characterized in that the two corrections stages are interchangeable.

6. Method according to claim 4 or 5, characterized in that the two corrections stages are carried out in an iterative way.

7. Method according to any one of claims 4 to 6, characterized in that the prefiltering stage comprises a morphological opening stage followed by an image-inversion stage.

8. Method according to claim 7, characterized in that the image-inversion stage is preceded by a scalar-type anisotropic scattering stage.

9. Method according to any one of claims 4 to 8, characterized in that the prefiltering also comprises a stage during which an interpolation to the nearest neighbour is carried out in order to double the size of the image vertically and horizontally.

10. Method according to any one of claims 4 to 9, characterized in that, in the presence of a plurality of acquisition images, the prefiltering also comprises a temporal filtering stage.

11. Method according to any one of the preceding claims, characterized in that the local processing of each zone consists of calculating the photon flux detected for each zone of the acquired image, and correcting the bias on each thus-calculated flux value.

12. Method according to claim 11, characterized in that the flux is calculated using an estimator of maximum likelihood calculated on a specific injection profile of each fibre.

13. Method according to claim 7, characterized in that, also applying the mask on an image representing a parasite background, the photon flux detected for each zone of the background image is also calculated, and the flux value of each zone of the corresponding background image is subtracted from each flux value of each zone of the acquired image, and the bias correction is carried out on the result of this subtraction.

14. Method according to claim 13, characterized in that the parasite background comes from the background of the image.

15. Method according to claim 13, characterized in that the parasite background comes from the calculation of an offset of the detection chain.

16. Method according to any one of claims 11 to 15, characterized in that the bias correction consists of spatially separating the fibres into different blocks, estimating the bias value in each block, interpolating the bias values so as to obtain a bias value for each fibre, and dividing, for each zone, the flux value obtained in the preceding stage by the thus-obtained corresponding bias value.

17. Method according to any one of the preceding claims, characterized in that the reconstruction of the acquired image involves a calibration stage in order to calibrate the flux of the acquired image, after local processing, and a mosaic reconstruction stage.

18. Method according to claim 17, characterized in that, for the calibration and for each zone of the acquired image, the flux value obtained after local processing is divided by a flux value obtained following an adjustment stage.

19. Method according to claim 18, characterized in that the adjustment stage consists of:

- isolating each zone of an adjustment image applying the mask, corresponding to the pattern of the fibres, to this adjustment image,
- calculating the photon flux detected for each zone of the adjustment image, and
- correcting the bias on each thus-calculated flux value.

20. Method according to claim 19, characterized in that the flux is calculated using an estimator of maximum likelihood calculated on the specific injection profile of each fibre.

21. Method according to claim 18 or 19, characterized in that, also applying the mask to an image representing a parasite background, the photon flux detected for each zone of the background image is also calculated, the flux value of each zone of the corresponding background image is subtracted from each flux value of each zone of the adjustment image, and the bias correction is carried out on the result of this subtraction.

22. Method according to claim 21, characterized in that the parasite background comes from the background of the image.

23. Method according to claim 21, characterized in that the parasite background comes from the calculation of an offset and from the noise of the detection chain.

24. Method according to any one of claims 17 to 23, characterized in that the mosaic reconstruction consists of distributing, over the whole surface of each zone of the acquired image, the flux value of each zone obtained following the calibration stage.

25. Method according to claim 24, characterized in that a low-pass filtering is carried out so as to make the reconstructed acquired image more regular.

26. Method according to any one of claims 3 to 25, characterized in that the reference image is an image obtained by placing a mirror opposite the guide.

27. Method according to any one of claims 3 to 25, characterized in that the reference image is an image obtained from a homogeneous scattering medium.

28. Method according to any one of claims 3 to 25, characterized in that the reference image is an image obtained from a homogeneous fluorescent medium.

29. Method according to any one of claims 3 to 25, characterized in that the reference image is an image obtained from the backscattering inside the bundle of optical fibres constituting the guide.

30. Method according to any one of claims 3 to 25, characterized in that the reference image is the acquired image.

31. Method according to any one of claims 19 to 30, characterized in that the reference image and the adjustment image are identical.

32. Apparatus for image acquisition using a guide made up of a plurality of optical fibres, and implementing a method according to any one of the preceding claims, characterized in that, for each optical fibre, it comprises:

- means for isolating, on the acquired image, a zone corresponding to this optical fibre
- means for locally processing each zone individually, and
- means for reconstructing the acquired image eliminating the pattern due to the optical fibres.

33. Apparatus according to claim 32, characterized in that it comprises means for modifying the sampling rate, the quality of injection into the optical fibres, and the setting of a detection chain in order to guarantee an "egg box" profile.

34. Application of the image-processing method according to any one of the preceding claims for one of the following fields:

- monitoring of the roughness of the surface of the guide;
- re-setting of the images, or stabilization of the image;
- super-resolution of an acquired image;
- quantization of images; and
- the temporal control of the internal parameters of the acquisition apparatus.